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El Salvador: Assessing the Impact of Rebel Surface-to-Air Missiles

Summary

In our judgment, the Farabundo Marti National Liberation Front (FMLN) insurgents' acquisition of surface-to-air missiles--SA-7s, SA-14s, Redeyes, and apparently SA-16s--from Nicaragua and Cuba has eroded Salvadoran military capabilities. The loss of three government aircraft to missiles since last November has prompted the Air Force to reduce the number of sorties and limit air support to ground forces. Although the Air Force has adjusted somewhat to the threat, the use of surface-to-air missiles could significantly degrade the government's counterinsurgency effort and give the guerrillas freer control over larger areas of the country. The insurgents intend to continue fighting while negotiating peace terms with the government, and some hardline FMLN units may retain and use the missiles even after a cease-fire agreement is signed.

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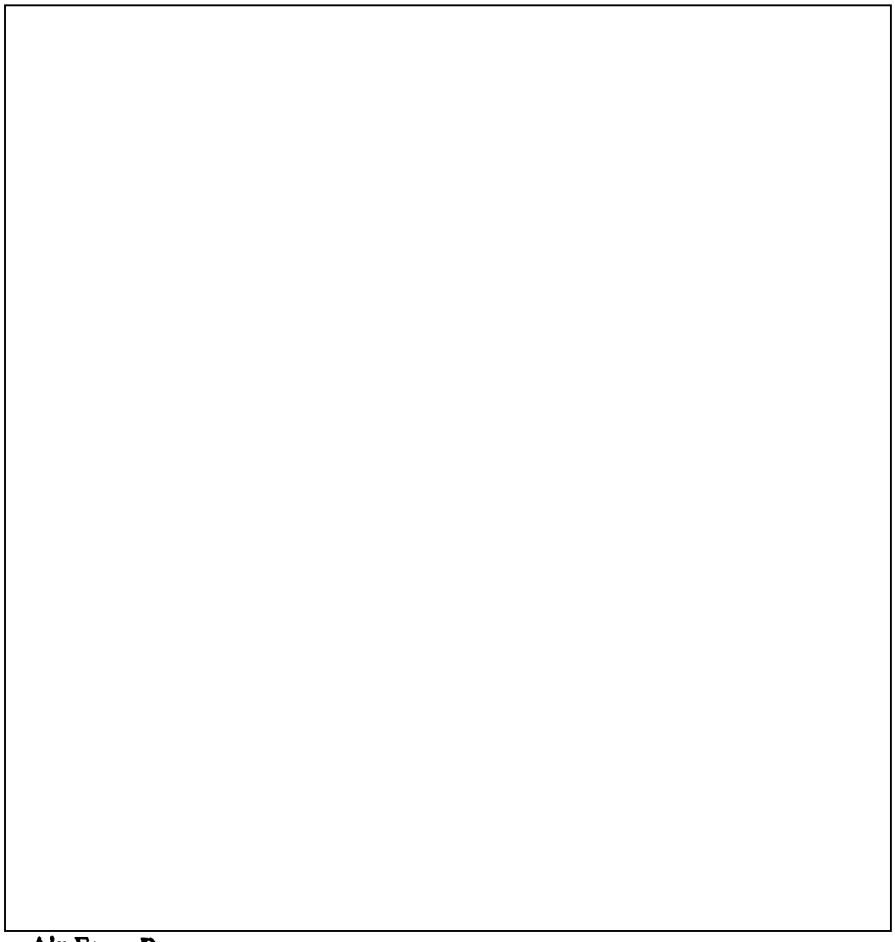
Over the course of almost 12 years of civil war in El Salvador, the Air Force has played an increasingly important counterinsurgency role. Air strikes helped stem the guerrilla offensive in November 1989, and close air support frequently has enabled government forces to prevail in clashes with the rebels. To neutralize the government's air power, the insurgents obtained surface-to-air missiles (SAMs), mainly from Nicaragua and Cuba. Since their first successful missile kill--the shoot-down of an A-37B ground-attack aircraft--on 23 November 1990, the rebels have used SAMs to down an AC-47 fixed-wing aircraft and a UH-1M helicopter gunship. These losses, along with recent reports that the Farabundo Marti National Liberation Front (FMLN) insurgents have acquired advanced missiles, have heightened the military's concerns that its air advantage could be jeopardized.

Types and Numbers of SAMs

The FMLN has SA-7, SA-14, and Redeye missiles, as well as at least one SA-16. Although SA-7s reportedly were delivered to the guerrillas in early 1989, we cannot confirm the presence of SAMs in rebel hands before November of that year, when the insurgents fired an SA-7 for the first time. Subsequently, the guerrilla inventory has grown to include SA-14s, a few Redeyes, and, apparently, SA-16s. A spent SA-14 firing tube was recovered by Salvadoran soldiers in November 1990,

We believe the insurgents have anywhere from 50 to 150 SAMs; the paucity of evidence prevents a more precise estimate. In late November 1990, a group of Salvadoran soldiers captured and later released by the guerrillas reported seeing at least 40 missiles in rebel hands.

Sources of Missiles



Air Force Response

Stunned by the guerrillas' acquisition of SA-7s in late 1989, the Salvadoran Air Force drastically cut back on missions, [redacted] Pilot training in evasion techniques, the introduction of countermeasure systems, and the failure of the FMLN to score a hit despite several SAM firings, however, gradually restored confidence. The Air Force also was buoyed by information that the North Korean-made SA-7s--the only known SAM in the guerrilla arsenal at that time--are notoriously inaccurate. [redacted]

Adjusting to the introduction of the more sophisticated SA-14 has come less quickly. The loss of three aircraft since last November, along with confirmation that the FMLN had obtained Soviet-made SA-14s, resulted in plummeting morale, a rise in pilot resignations, and timidity in providing air support to ground troops. In December, Air Force reluctance to fly resupply or close air support missions in the combat zones of Chalatenango contributed to the rout--and retreat into Honduras--of three companies of the Bracamonte Immediate-Reaction Infantry Battalion. The practice of flying at tree-top level to avoid SAMs, moreover, increased aircraft losses and damage from groundfire.[2]

While still wary, the Air Force has begun to recover. Recent guidelines from the Armed Forces High Command provide for a more conservative use of aircraft that reduces risks; for example, most medical evacuation and resupply missions are flown at night, and close air support is more carefully circumscribed. The new rules, combined with Air Force directives to avoid areas where missiles have been sighted and to drop bombs from higher altitudes, have reduced aircraft losses and bolstered morale, US aircraft deliveries and the personal interest shown by senior US officials also appear to have stiffened Air Force confidence. Since November, US pilots in Panama have trained Salvadorans in defensive tactics against missiles, and the United States has provided improved electronic countermeasures as well as briefings and technical data on the various SAMs. In January, the Commander-in-Chief, US Southern Command, turned over three A-37B aircraft and five UH-1M helicopters to the Salvadoran Air Force in a well-publicized ceremony in San Salvador.

Nonetheless, the introduction of SAMs clearly has eroded some of the government's air advantage. Sortie rates have not returned to the levels common before the first rebel shoot-down using a SAM, and the perception of many ground force commanders is that the Air Force has become overly cautious and less effective. Moreover, we believe further losses to guerrilla missiles would restart the cycle of low morale, loss of confidence, and hesitance to fly on the part of Air Force pilots and commanders. Statements by Colonel Mauricio Vargas, Vice Chief of Staff, categorizing the SAM threat as minimal almost certainly do not reflect Air Force thinking and reinforce suspicions that the High Command takes the risks lightly.

[2] One US and two Salvadoran helicopters have been shot down by rebel small-arms fire this year. In each case, the helicopters were flying low to avoid possible attacks with surface-to-air missiles. The rebels executed two of the three crew members of the US helicopter after it was downed in January.

Implications

The use of SA-14s and -16s by the guerrillas could significantly degrade the effectiveness of the government's counterinsurgency effort. The rebels, for example, could engage ground forces and then use missiles to ambush aircraft called in for ground support. Similarly, the guerrillas could mass SAMs near the two airbases and hit aircraft as they take off and land.

The resulting loss of more pilots and aircraft clearly would affect the Air Force's strategy. The service would likely adopt an even more conservative posture, thereby giving the FMLN freer control over larger areas. The Air Force already has reduced flights over territory where it believes missiles are located, and we notice an increasing tendency for the guerrillas--considering themselves secure from aerial attack--to mass in larger numbers in those areas. The rebels could encourage a prolonged absence of air power by displaying SAMs to the news media or by occasionally firing on approaching aircraft.

The missiles could pose a continuing threat even after the government and the FMLN sign a cease-fire agreement.

ANNEX

Insurgent Surface-to-Air Missiles

The SA-7. The SA-7 is a man-portable, shoulder-fired, infrared homing missile designed by the Soviets in the 1960s for use against low-flying aircraft. The system consists of a launch tube (containing one missile), a gripstock, and a thermal battery. The gripstock attaches to the launch tube and houses the acquisition and tracking electronics as well as the firing mechanism. The seeker and guidance-control electronics on the missile guide it to the target after firing. Both the launch tube and the battery are expendable; the gripstock can be reused by attaching it to an unfired missile. The SA-7 is manufactured in several countries other than the USSR--including China, North Korea, and Egypt--and has been exported to more than 50 countries.

Several factors probably have contributed to the insurgents lack of success with this weapon thus far:

-- Because the gunner must visually spot and identify his target, the SA-7 is limited to daylight use.

-- The missile has only a limited capability to attack oncoming aircraft.

-- The SA-7 is susceptible to a wide range of countermeasures: flares, infrared jammers, heat-suppression devices, low reflective paint, and evasive maneuvers.

The SA-14. While similar in many respects to the SA-7, the SA-14 is a second-generation SAM with greater range and an enhanced ability to attack aircraft flying in any direction, including head-on. Although flares can decoy the SA-14, infrared pulse-type jammers currently used on some Salvadoran aircraft will have no effect on the missile. The missile is manufactured only in the USSR and Bulgaria; in this hemisphere, it has been exported only to Cuba and Nicaragua.

The SA-16. The SA-16 is a much more effective weapon than the SA-7 and SA-14 from which it was developed. It has longer range, greater accuracy, and better electronics than the older missiles, and, although it can be defeated by flares, it is not deterred by the jammers used on Salvadoran aircraft. In some ways, the missile is comparable to the early-model US Stinger basic surface-to-air missile. The SA-16 is manufactured only in the USSR and, like the SA-14, has only been exported in this hemisphere to Cuba and Nicaragua.

The Redeye. The Redeye is a US-manufactured, man-portable, shoulder-fired weapon designed to defend against low-flying aircraft. It has been operational with US forces for more than two decades and is also used by several allied

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nations. Although the missile is electronically complex, it is designed for simple, reliable operation in the field, can be made ready to fire in seconds, and requires little training. The missile comes encased in a fiberglass launcher equipped with carrying strap and sight. The supersonic missile carries an infrared sensor in its nose and homes in on the heat of an aircraft engine. Like the SA-7, the Redeye cannot engage oncoming aircraft and can be decoyed by flares.

Training. Although the SA-7, -14, -16, and Redeye are relatively simple weapons, an effective training program for SAM gunners must use simulators to practice the acquisition and engagement of maneuvering aircraft. Cuba and Nicaragua both have such training devices.

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Characteristics	SA-7	SA-14	SA-16	Redeye
Date fielded	1966	1978	1981	1965
Length (mm)	1,340	1,400	1,685	1,220
Diameter (mm)	70	75	72	70
Missile weight (kg)	9.2	10.3	21	13
Complete system wt. (kg)	14	15	28	13
Max. eff. altitude (m)	2,300	3,000	3,000	3,000
Min. eff. altitude (m)	25	10	10	25
Max. eff. range (m)	3,600	4,500	5,000	3,300
Max. speed (m/sec.)	470	470	580	530
Max. target speed (m/sec.)	250	310	370	230

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